Report AR-004

Recruit Attrition and the Training Unit Environment

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This report describes a study that examined the relationship between the attrition histories of training platoons and the performance and attrition of Marine Corps recruits differing in high school graduation status. Non-high school graduates placed in platoons with histories of high attrition had especially high attrition rates. This finding replicates the results of an earlier study. The results suggest that the attitudes and expectations

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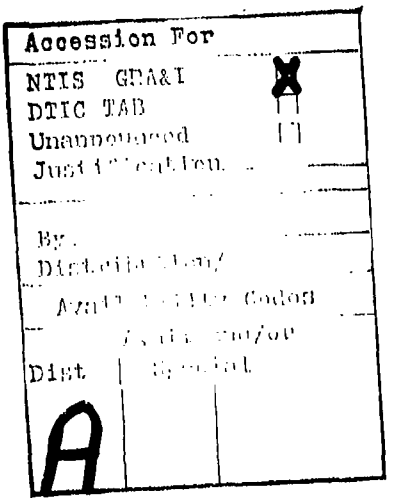
of drill instructors may exert critical influences over the performance and attrition of platoons.



Summary

This study investigated recruit attrition rates as a function of the training unit environment and whether or not recruits are high school graduates. The study, replicating previous research, showed that there are large differences among platoons in recruit attrition and that these differences cannot be explained simply on the basis of the characteristics of recruits. High school non-graduates in platoons with histories of high attrition have very high attrition rates. However, high school non-graduates in platoons with histories of low attrition have much lower attrition rates. Whether or not recruits are high school graduates is highly important, but only when considered in conjunction with training unit factors. This study, together with evidence from previous research, suggests that drill instructors' beliefs, expectations, and attitudes play significant roles in influencing rates of recruit attrition.

The stressful nature of recruit training arises from (1) the challenges that must be met in the course of training, and (2) the particular way in which the training regimen is implemented by training unit personnel, particularly the drill instructor team. Variations in the way training is conducted by unit leaders may be linked to problems of attrition, performance, and adjustment.

We have conducted research related to recruit training guided by theories of stress and coping (Cook, Novaco, & Sarason, 1980; Novaco, Sarason, Cook, Robinson, & Cunningham, 1979). Our focus has been on the roles of both personal characteristics and environmental factors. Stress can result from high intensity environmental demands (stressors) and also from low levels of coping resources. This implies that stress can be reduced by augmenting stress coping skills, even when the level of environmental demands is high.

We have found that recruit attrition cannot be explained simply on the basis of either pre-training variables or differences in performance standards of unit leaders. The present report is concerned with a replication of the findings about training units that we obtained with an October, 1978 cohort of recruits at Marine Corps Recruit Depot, San Diego. It involves an examination of training environment factors as they relate to attrition and performance among recruits in the June, 1979 cohort. This report thus pertains to the environmental component of our stress perspective. The coping skills component is currently being examined in other studies and will be the topic of subsequent reports.

The October, 1978 cohort study found that attrition varied from 0% to 28% across a sample of 15 platoons (Novaco et al., 1979). This variation seemed to be associated with the manner in which the drill instructor team conducts the training. Despite the highly routinized and specified procedure

for the conduct of training, the social environments of platoons seem to vary in ways that affect recruit adjustment and which are reflected in differential rates of attrition.

There are several ways in which variation among platoons in attrition might be interpreted. The variation in attrition might be due to a variety of pre-training variables, such as demographic, aptitude, or personality factors. Variation in platoon attrition might, also, result from an uneven distribution of these variables across platoons. Another possibility is that the differences in attrition are a function of differences in the performance standards of unit leaders. This explanation asserts that attrition is directly correlated with performance. High attrition rates would then result from the exclusion of low achieving recruits from high achieving units. Conversely, low attrition training units would reflect laxity in achievement standards. Furthermore, this view maintains that low attrition during the training cycle constitutes a suppression of attrition that will inevitably occur after graduation during the enlistment period.

Our previous research (Novaco et al., 1979) approached these issues by first classifying platoons into low, medium, and high attrition groupings. In conjunction with these training unit attrition groups, we found no significant differences on pretraining variables and that training units with high attrition rates did not have higher performance attainments. Longitudinal analyses of the October, 1978 cohort also demonstrate that the attrition patterns established in recruit training continue into the enlistment period. A subsequent report will present the findings on this latter issue.

In the present study, we sought to replicate the results previously obtained with the October, 1978 cohort by conducting similar analyses with the June, 1979 cohort. In addition, we examined the influence of high school

graduation status as another variable which might have some particular relationship to the training unit effects. In order to further test our assertion about differences in the social climates of platoons, we also conducted an analysis of drill instructor attitudes. This report contains some of the preliminary findings from that investigation.

Method

Design and Subjects

In order to track the possibility of recurrent attrition patterns among drill instructors, the present study was conducted with the recruit training battalion for which there was the largest platoon membership in the previous October cohort study. This was done so that we might examine attrition rates for June platoons as a function of drill instructors' October attrition rates. As we report later, tracking this hypothesized association was more difficult than anticipated.

The sample, then, was drawn from 16 platoons in one battalion which contained a total of 1,287 recruits. Using a stratified random sampling procedure done by computer, a 30% sample was drawn from approximately 80 cases in each platoon. This generated a subset of 387 recruits (22 to 27 from each platoon) upon which we performed our analyses.

The distribution of platoon attrition rates for the June, 1979 cohort was compressed relative to the previously studied October cohort, as the overall monthly rate was lower (8.3% vs. 12.3%). Among the June platoons studied, attrition ranged from 2.5% to 13.4%. These are the rates for the entire platoon. Because of the compressed distribution, our attrition rate groupings (ATTRITVAR) were based on a two-level (low, high) classification of platoons, in contrast to the three-level classification utilized in our

previous research. It did not appear that we could meaningfully categorize platoons using a three-way classification. Therefore, the Low ATTRITVAR condition consisted of seven platoons whose attrition rates ranged from 2.5% to 8.5%, while the High ATTRITVAR condition was composed of nine platoons having attrition rates of 10.0% to 13.4%.

The attrition rate for each platoon was computed by tracking all discharges from among June accessions, regardless of whether or not they happened to fall into the research sample. When a recruit was discharged, the attrition was credited to the original platoon to which he was assigned at forming. This procedure controlled for the possibility that marginal recruits might be "farmed out" to other units which would otherwise be credited for the discharge if the recruit subsequently attrited. Thus, attrition rates were calculated on the basis of actual population values, not as population estimates based upon the sample.

Measures and Procedure

Demographic and aptitude measures were obtained directly from Recruit Administrative Management System (RAMS) accession files. The aptitude measures consisted of scores on the Armed Forces Qualification Test (AFQT) and several subscales of the Armed Services Vocational Aptitude Battery (ASVAB): General Technical (GT), Combat Orientation (CO), and General Information (GI). The principal demographic variable was high school graduation. Age, weight, and height were also incorporated in our analysis.

Performance data on rifle marksmanship, physical fitness, and oral and written tests of military knowledge were obtained from training regiment archives according to platoon rosters. As in our previous research, senior drill instructors were asked to rate all recruits in their platoon just after

graduation. The ratings of motivation, cooperation, intelligence, and overall performance were performed on five-point scales from "unsatisfactory" to "outstanding." Explicit instructions were given to consider a rating of 3 to correspond to the average recruit, so as to anchor the ratings.

A variety of crosstabulation, regression, and analysis of variance techniques were used. The primary analyses concern the ATTRITVAR groups and high school status. Additional analyses involved comparisons of the October and June cohort samples on pretraining variables. Most of the analyses parallel those that were conducted with regard to the October cohort.

One additional procedure was used to examine the relationship of drill instructor attitudes to performance as defined by platoon attrition rate. In actuality, this is part of a separate study, to be reported later, in which groups of drill instructors were administered a large questionnaire of attitudes and cognitions about recruit training. The respondents were grouped according to their ATTRITVAR performance. Here we present some preliminary findings on a few items from this study so as to elaborate on the training unit environment hypothesis. The drill instructor respondents here come from the two battalions in the training regiment other than the one involved in the recruit analyses.

Results

Pretraining Factors, Attrition, and Performance

The relationships between training outcome and pretraining variables were examined in cross-tabluations and analyses of variance performed for age, education, race, height, weight, and aptitude measures. The findings are highly consistent with the results of the October, 1978 cohort study.

Attrition is not significantly related to the pretraining variables of age, race, height, or years of education. The results replicate those of the earlier study. As we have found previously, those who attrite do differ significantly from those who graduate with regard to weight at the start of training. Attriters (M = 163.8 lbs.) are heavier than graduates (M = 152.3), F (1, 382) = 7.81, $p < .006$). The educational attainment analysis was performed on years completed after eighth grade, and there is no significant difference between graduates (3.82 years) and attriters (3.61 years), F = 3.25, (1, 382), $p < .08$. We address the relevance of high school completion status later in conjunction with training unit effects.

Some relationships between attrition and aptitude measures were found. While graduates (M = 54.97) and attriters (M = 52.58) do not differ significantly in AFQT scores, differences were found on two ASVAB sub-tests. Graduates (M = 101.8) have higher Combat Orientation scores than do attriters (M = 92.1), F (1, 380) = 6.98, $p < .01$; graduates (M = 102.5) also score higher than attriters (M = 95.2) on the General Technical sub-test, F (1, 380) = 4.67, $p < .035$. No differences were found for the General Information sub-test. These results on aptitude measures are consistent with our findings in the October cohort study.

With regard to the performance measures of marksmanship, physical fitness, military knowledge, and drill instructor ratings, no significant relationships were found for age, education, height, or weight. The one exception here was that high school graduates (M = 3.48) are rated higher than high school non-graduates (M = 2.94) by drill instructors in "overall performance," F (1, 292) = 4.78, $p < .03$. There are no significant differences for high school status in ratings of "motivation," "intelligence," or "cooperation." No significant differences occur in drill instructor ratings

as a function of race. Yet, consistent with the October study findings, there are statistically significant differences, albeit of little practical value, between Caucasians and non-Caucasians. Caucasians perform higher on marksmanship and tests of military knowledge, whereas Blacks have higher PFT scores. As we have noted previously (Novaco et al., 1979), the differences between means for racial groups are quite small and result from both the stability of the performance measures and the large sample size. For example, the mean military knowledge oral test score is 48.36 for Caucasians, 47.74 for Blacks, and 47.13 for other non-Caucasians, yet these small differences are statistically significant at $p < .03$.

Correlations performed between aptitude and performance measures resulted in a pattern of low magnitude coefficients. Twenty-five of 36 coefficients are significant ($p < .05$), but only 9 have magnitudes greater than .20. The strongest associations were between the written test of military knowledge and the ASVAB General Information ($r = .30$) and General Technical ($r = .27$) sub-tests. The relationships for the oral test are weaker (average $r = .16$). No statistically significant association was obtained for physical fitness tests, however rifle scores correlated with AFQT ($r = .22$) and ASVAB Combat Orientation ($r = .23$) at a significant level ($p < .001$). With regard to drill instructor evaluations, the highest correlations were obtained for ratings of intelligence (average $r = .20$). As was observed in the October study, the magnitude of these correlations weighs against their predictive utility.

Training Units and Attrition

The examination of training unit influences has proceeded from a categorization of platoons based on their attrition rates. In the October cohort study, the variation in attrition across platoons enabled us to generate a three-level classification. However, in the present June cohort,

the variation in unit attrition was less, as we noted earlier. Hence, we adopted a two-level classification (low, high).

Related to this reduced range of unit attrition rates is a lower overall rate of attrition. As Figure 1 illustrates, for the 1974-1979 period, the June cohort attrition has consistently been less than that for October. The one exception occurred in 1976, when the cohort rates were identical (8.0%).

These observed differences in cohort attrition rates might be explained by initial composition factors. It might be argued that October recruits are of lesser quality than June recruits, and that this accounts for their higher rate of attrition. To investigate this popular explanation, we conducted t-tests on the aptitude data for the October and June samples. The data on these measures are presented in Table 1. It can be seen that on none of the four aptitude measures do the regular recruits in June have significantly higher aptitude scores. In fact, on two measures (AFQT and ASVAB-GT) the October regular recruits are significantly higher.

It can also be seen that reservists in June are consistently higher in aptitude than reservists in October, and it might be thought that the lower June attrition rate is a result of this difference. However, the reservists in June also differ significantly in aptitude from regular recruits. Reservists have higher scores on AFQT ($p < .0001$), years of education ($p < .02$), and on eight ASVAB subtests (seven are significant at $p < .001$). Yet, despite these clear, unequivocal aptitude differences, there is no difference in the sample rate of attrition for regulars (8.2%) versus reservists (8.0%). Further, the components in our sample do not differ in performance attainment, except on written test of military knowledge ($p < .02$), for which reservists score slightly higher (47.58) than regulars (46.65). These data regarding component comparisons within the cohort negate the interpretation of the

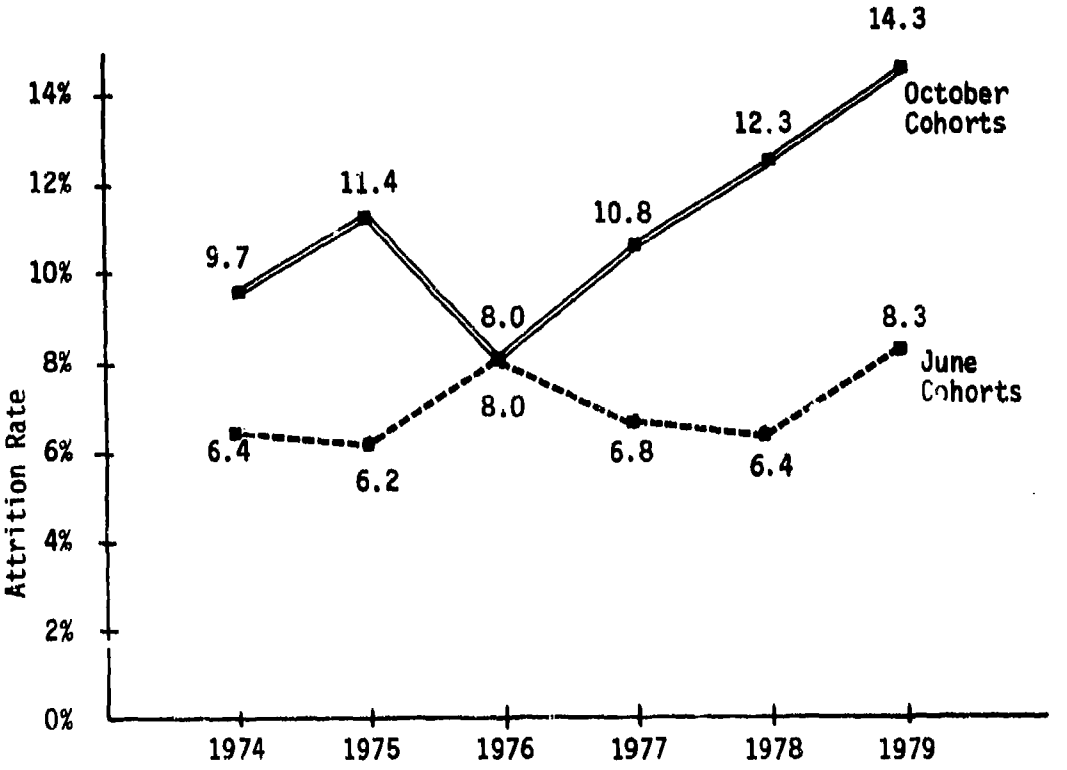


Figure 1. Attrition patterns for June and October Cohorts at MCRD, San Diego

Table 1

Sample Comparability on Aptitude and Age
as a Function of Component and Monthly Cohort

Groups	AFQT	ASVAB-GI	ASVAB-GT	ASVAB-CO	Age
October Cohort					
Regulars	56.14 (16.22)	9.65 (2.93)	102.48 (16.45)	98.82 (20.08)	18.69 (1.81)
Reserves	51.62 (19.59)	9.76 (2.87)	99.07 (13.15)	95.40 (18.83)	18.94 (1.64)
June Cohort					
Regulars	52.31 (16.61)	9.51 (3.03)	99.30 (17.45)	98.93 (19.11)	18.75 (1.32)
Reserves	61.55 (18.42)	10.83 (2.59)	108.53 (17.74)	106.63 (19.63)	18.70 (1.07)

Note: Significant differences exist in t-test comparisons within component (regulars/reserves) across cohorts (October vs. June) for AFQT ($p < .001$ for both regulars and reserves), ASVAB-GT ($p < .02$ for regulars; $p < .001$ for reserves), and ASVAB-CO ($p < .001$ for reserves only). Standard deviations are given in parentheses.

lower June cohort attrition (vis-à-vis October) as being due to the higher aptitude of reservists.

Training Unit Attrition Groupings

The analyses of training units according to their attrition rates (ATTRITVAR) were conducted on the various pretraining dimensions and the training performance scores to address the issues of initial composition and performance standards. In addition, the influence of high school graduation status was examined in conjunction with the ATTRITVAR factor.

As we have found previously, there are no differences between Low ATTRITVAR and High ATTRITVAR groups that would support an initial composition interpretation of variation in attrition. No significant differences were found between groups on any demographic or aptitude measure. One significant difference (F (1, 296) = 4.78, $p < .03$) was obtained in the ANOVA for the initial physical fitness test (PFT), resulting from higher PFT scores for the high ATTRITVAR condition. This, of course, is exactly oppostite to the belief that initial composition factors account for attrition.

A variation of the initial composition belief about attrition is that high school graduation status is a major determinant of attrition. Since our hypothesis is that attrition is, to an important extent, a result of training unit environments, we examined the interrelationship of high school graduation status, ATTRITVAR condition, and rate of attrition in the June sample. The results are presented in Table 2. It can be seen that indeed high school non-graduates have a higher attrition rate, but the effect occurs only as a function of ATTRITVAR. The attrition rate for those who have not graduated high school is virtually identical to that for high school graduates, if one compares the high school non-graduates in low ATTRITVAR platoons with high school graduates in high ATTRITVAR platoons. High school graduation status is a significant factor only in conjunction with high ATTRITVAR training units.

Table 2

Attrition Rates for High School Graduates versus Non-Graduates as a Function of Training Unit Groupings for the June, 1979 Sample

Groups	High School Non-Graduates	High School Graduates
Low Attrition Platoons	8.86%	5.80%
High Attrition Platoons	23.53%	8.83%

Note: The data pertain to the entire membership (N=1287) of 16 platoons in the June cohort.

Prompted by this finding, we performed the same analysis on our October study data, not having done this previously. These data appear in Table 3 and show the same effect even more clearly with the presence of the middle ATTRITVAR condition. In low attrition platoons, high school non-graduates attrite at a slighly higher rate than high school graduates, but their rates are the same for the medium attrition platoons. Only in the high attrition platoons does one find a sizeable difference according to high school status. Thus, the findings from both cohort studies indicate that high school graduation status bears on attrition only through the influence of training unit environments.

The relationship of ATTRITVAR to performance was examined with high school status as an additional blocking factor. Beliefs about performance standards as determinants of attrition are that attrition results from the performance standards of unit leaders, so that high attrition units should perform better than low attrition units. Moreover, the fact that performance measures are taken late in the training cycle, after attrition has occurred, increases the chance that such performance differences would be obtained. As can be seen from the data in Table 4, there is no support whatever for the performance standards belief, nor are there any differences as a function of high school graduation status.

Drill Instructor Attitudes and Performance

While the results of our cohort analyses are contrary to the beliefs that variation in attrition are due to pretraining factors or to the performance standards of unit leaders, our hypothesis about training unit social environments is in need of explicit confirmation. That is, we infer from the data that since the ATTRITVAR conditions are equivalent on pretraining dimensions and attained performance, then differences in unit attrition must be due to the manner in which the drill instructor team conducts the training.

Table 3

Attrition Rates for High School Graduates versus Non-Graduates as a Function of Training Unit Groupings for the October, 1978 Sample

Groups	High School Non-Graduates	High School Graduates
Low Attrition Platoons	8.24%	5.31%
Medium Attrition Platoons	12.70%	12.50%
High Attrition Platoons	23.17%	14.29%

Note: The sample (N=597) consists of all recruits accessed on ten days randomly selected from the month of October, 1978.

Table 4

Mean Performance Scores as a Function of

High School Graduation and Rate of Attrition Category

Groups	(N)	Rifle	PFT 3	PFT Change	Oral Test	Written Test
High School Non-Graduate						
Low Attrition Platoons	18	202.39 (13.36)	241.67 (33.52)	46.65 (24.26)	48.22 (1.93)	46.33 (2.35)
High Attrition Platoons	23	203.30 (14.68)	241.90 (34.93)	30.74 (40.60)	48.67 (1.71)	45.71 (3.91)
High School Graduate						
Low Attrition Platoons	116	203.37 (11.97)	236.25 (42.90)	38.79 (39.96)	48.34 (2.39)	47.05 (2.36)
High Attrition Platoons	149	203.56 (13.74)	245.12 (32.63)	37.52 (34.96)	47.97 (2.19)	47.06 (3.08)

Note: There are no significant differences between group means for any measure. Standard deviations are given in parentheses.

The fact that high school non-graduates perform equally well as high school graduates yet have a strikingly higher attrition rate in the high ATTRITVAR condition also indicates that social climate factors are operating.

In order to provide more explicit confirmation of the training unit environment hypothesis, we tracked the performance of drill instructors from the October study in terms of their unit attrition outcomes in the June study. By means of the ATTRITVAR codings from October, we sought to determine whether June attrition followed as a repitition of drill instructor's previous performance. As described earlier, one battalion was selected for this study so as to maximize the possibility of reassigned drill instructors appearing in our sample and to eliminate effects due to variation in battalion environments. However, this analysis proved to be more difficult than anticipated because of inadequate numbers of codified drill instructors. By coding June platoons according to senior drill instructor's attrition rate for October (alternatively, that for two junior drill instructors if data for the senior were unavailable), the pairing of June and October rates correlated $\underline{r} = .35$ for the 10 of the 16 platoons that could be classified. This analysis, however, is weak methodologically. A more thorough codification must obviously be made that involves all members of the drill instructor team and entails a tracking across several series.

In a separate study of drill instructor attitudes, we have administered a large questionnaire and have correspondingly obtained ATTRITVAR codings of the respondents. Some preliminary findings from this study are presented in Table 5 for a sample of 28 drill instructors from the two battalions not involved in our June cohort study. Low attrition drill instructors differ from high attrition drill instructors on some key attitudinal dimensions. When asked to what extent drill instructor attitudes influence platoon

Table 5

Comparison of Drill Instructor Responses to Questionnaire Items as a Function of the Attrition Outcome of Their Platoon

Attrition Outcome Groupings	N	"DI Attitudes"	"Summer vs. Winter"	"Recruits Would Stay"
Low Attrition	7	3.00 (1.15)	2.71 (1.11)	3.71 (0.95)
Medium Attrition	13	3.31 (1.11)	3.15 (1.28)	2.92 (1.04)
High Attrition	8	1.88 (0.64)	4.00 (0.756)	2.38 (1.19)

Note: The attrition outcome groupings are a categorization of the drill instructors according to the attrition rate of their platoon. The "DI Attitudes" item pertains to the ratings given with regard to the respondent's belief about the degree that drill instructor attitudes influence attrition rates at the platoon level (4 = very much, 3 = fairly much, 2 = somewhat, 1 = not at all). The "Summer vs. Winter" item pertains to the belief that summer recruits are better than winter recruits (5 = strongly agree, 1 = strongly disagree). The "Recruits Would Stay" item pertains to the belief that if recruits could leave after two weeks, most would choose to stay (5 = strongly agree, 1 = strongly disagree).

attrition rates, low and medium ATTRITVAR drill instructors respond "fairly much" to "very much," while high ATTRITVAR leaders respond "somewhat" to "not at all." In addition, the means show a linear relationship between attrition rate and the belief that summer recruits are better than winter recruits. High attrition drill instructors believe that summer recruits are superior to winter recruits, whereas low attrition drill instructors disagree. Another linear association was found between attrition rate and doubt in the perseverance of recruits. Low attrition leaders believe that recruits would stay in recruit training if given the choice to leave, while high attrition drill instructors believe the recruits would choose to leave. These findings indeed corroborate our hypothesis about platoon social environments.

Discussion

Our research dealing with the performance and attrition of Marine Corps recruits has yielded a number of interesting findings, such as the relatively low correlations between aptitude and performance measures. However, the findings with the most important implications are those pertaining to the effects of the training unit environment. The present results are particularly impressive because they corroborate the outcomes of an early study. Both studies showed that (1) there are large differences among platoons in recruit attrition, (2) these differences are not attributable to the pre-training characteristics of recruits, and (3) platoons with high attrition rates do not attain higher performance levels than do platoons with low attrition rates. These findings suggest that the social environment of training units is a key determinant of attrition.

In addition to these replicated findings, some striking evidence concerning the training unit environment was found in the present study in comparisons between recruits who are high school graduates with those who are not. Recruits

who have not graduated from high school differ in attrition rate for high school graduates primarily when they have been assigned to platoons that produce high attrition. Thus, whether or not recruits are high school graduates is highly important, but only when considered in conjunction with training unit factors. Clearly, it is necessary to gain a better understanding of the atmospheres of platoons differing in attrition.

Without question, the drill instructor is the central figure in determining the atmosphere of any given platoon. Our evidence suggests that drill instructors whose platoons differ in recruit attrition differ in certain attitudes and expectations. Drill instructors whose platoons have low attrition believe strongly that the attitudes of drill instructors influence attrition rates. They also have more confidence that their recruits would remain in training even if they were given the option of leaving. Drill instructors whose platoons have high attrition rates have much weaker convictions about both the influence of drill instructors' attitudes and the motivations of recruits to become Marines. In addition, drill instructors who lead high attrition platoons are more strongly convinced that summer recruits are better than winter recruits.

We believe it is useful to think of platoons as social environments. The drill instructors' levels of self-confidence and sense of personal responsibility in shaping recruits into Marines are communicated to recruits and, in turn, influence recruits' levels of self-confidence, commitment, and motivation. We are now conducting research on the characteristics (attitudes, expectations) that drill instructors bring to their jobs. In doing so, we hope to better understand some of the subtle, and perhaps unintended, influences at work in recruit training.

It is worthwhile remembering that recruit training is stressful for

both the drill instructor and the recruit. The sorts of influences exerted on recruits by the drill instructor may depend importantly on the level of stress under which the drill instructor operates. One of the products of our research will be training modules suitable for use in Drill Instructor School. These modules will, we believe, help drill instructors cope as effectively as possible with the stresses and strains related to the performance of their complex and challenging duties.

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